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AUTOMATIC SPRINKLER SYSTEMS

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This invention relates to sprinklers adapted on an increase in ambient air temperature as occurs in the case of a fire, automatically to come into operation to spray liquid.

Most sprinkler systems are designed to operate at a comparatively low water pressure and because of this low pressure it has hitherto necessitated a design of sprinkler head having a deflector plate to break up the jet of water and thus give the necessary floor coverage.

Moreover the standard spray head incorporated in a sprinkler system when connected up to the system projects below the ceiling so that the entire head is visible. This arrangement besides being rather unsightly in some cases results in the heat sensitive element being partially enclosed so that its response to changes in temperature is sluggish.

It is among the objects of the invention to provide a sprinkler head in which the spray deflector plate is eliminated while still securing the necessary coverage.

According to the invention a sprinkler head comprises a body member or housing having at one end an inlet for connection, when in use, to a source of liquid supply and provided at its other end with a discharge outlet in the form of a restricted orifice capable of producing an all-round spray discharge, a plug member arranged to be seated in the discharge outlet, means by which the plug member is normally maintained in a position in which the discharge outlet is

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sealed to prevent passage of the liquid through the the housing which means also operate on a rise in ambient temperature to release the plug member to permit a flow of liquid through the housing, and means within the housing whereby the liquid flow, on release of the plug member is separated into two streams, an inner stream which as a direct flow path through the housing and an outer stream to which is imparted a swirling motion whereby liquid on passing out of the discharge outlet will be broken up into droplets and dispersed over an area proportional to the swirling motion imparted to the liquid.

The invention is illustrated by way of example in the accompanying drawings in which,

Figure 1 is a vertical section through a sprinkler head according to the invention,

Figure 2 is a corresponding plan view and,

Figure 3 is an elevation in the direction of the arrow 'X' shown in Figure 2.

Referring to the drawings the sprinkler head comprises a cylindrical housing or body member 1 formed at its lower end with a inturned flange 2 defining a central orifice 3 which constitutes the discharge outlet. The housing 1 is provided at its upper end with a connecting member 4 having a central bore 5 forming an inlet opening and an externally screw-threaded portion 6 by which the head is connected to a source of liquid supply. The connecting member 4 also has a central hexagonal nut portion 7 and a downwardly depending skirt portion 8 which is externally screw-threaded to engage a corresponding thread formed

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within the upper end of the housing or body member 1. A suitable washer 9 is arranged between the upper edge of the housing 1 and the nut portion 7.

Mounted in a counterbore formed in the housing 1 is an insert 10 which is held in position by the lower end of the skirt portion 8. The insert 10 has a central bore 11 for the direct flow of liquid there-through and on its outer periphery is formed with a series, for example four, of helical passages 12 which are arranged so that a swirling motion is imparted to the liquid passing there-through.

10 The lower end of the housing 1 is externally screw-threaded to receive a hexagonal retaining ring 13 formed with two pairs of oppositely disposed recesses 14 and 15.

Arranged adjacent the lower end of the housing 1 is a cover plate 16 in the form of an arcuate or dome-shaped disc which serves to cover the end of the housing and to support a plug member 17 having a sealing ring 18 which plug member is arranged to fit within the orifice 3 to prevent the passage of liquid through the head. The plug member 17 is formed with a spigot 19 which extends into a central positioning hole formed in the plate 16. Alternatively the plug member may be formed integrally with the cover plate.

20 The cover plate is held in position by means of a pair of lever arms 20, one end of each of which is disposed in one of the recesses 14 and is formed with an inturned claw 21 to engage the retaining ring 13, while the other ends are formed with recesses to receive a frangible bulb 22. The cover plate 16 is formed with slots 23 in which the lever arms 20 are fulcrumed.

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In use, the cover plate rests on abutments 24 formed on the two lever arms 20 in such a way that due to the fact that the cover plate tends to fall away from the housing, the claws 21 of the levers tend to move outwardly away from the rim of the retaining nut 13. It follows therefore that, due to the fulcrum action, the lower ends of the lever arms 20 tend to approach one another and this movement is resisted by the frangible bulb 22 or the end pieces 25 in which it may be supported.

10 Further openings 26 are provided in the cover plate to permit of insertion of a tool therethrough to engage the recesses 15 in the retaining nut 13 to effect adjustment or tightening of the seal formed by the plug 17.

In the event of the bulb fracturing, due to a rise in temperature, as is the normal practice of sprinkler bulb type heads, the lower ends of the lever arms 20 are free to move inwards, and as a result thereof the claws 21 will become disengaged from the retaining nut 13. When this occurs the plate 16, plug 17, sealing ring 18 and the lever arms 20 will fall way thus allowing liquid to discharge through the bore 11 and the passages 12 and thus through the outlet.

20 The effect of the liquid passing both through the central bore 11 and through the passages 12 which impart a swirling motion thereto, together with the size and formation of the flange 2, is such as to cause the liquid passing out of the discharge outlet to be broken up into droplets and to be dispersed over an area proportional to the swirling motion applied to the liquid.

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The insert 10 and design of the outlet of the housing 1 may be so arranged that discharge of liquid in gallons per minute is equivalent to normal sprinkler practice and requirements, and the uniformity of spray over a diameter of approximately 14'6" is better than a number of standard type sprinkler distributions, due to the absence of yoke arms interfering with the distribution. The spray can be used with low pressures, i.e. 5lbs. per square inch running pressure, as well as with high pressures, so that it will comply with the normal sprinkler requirements.

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The sprinkler head according to the invention has the advantage that due to the absence of internal movable parts costs are reduced and in addition the chances, as is often the case with known heads, of the sprinkler not functioning due to parts becoming lodged in the deflector plate and not falling away are eliminated since no deflector plate is used. Moreover the head can be inserted into false ceilings so that only the cover plate, levers and bulb are visible without any obstruction to the spray.

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The bulb ends and the shape of the bulb may be designed so that the sensitivity of the sprinkler head is almost the same whether the air flow is at right angles or parallel to the bulb.

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What we claim is:-

1. A sprinkler head for use in automatic sprinkler systems, comprising a body member provided at one end for connection, when in use, to a source of liquid supply, a discharge outlet in the form of a restricted orifice capable of producing an all-round spray discharge provided at the other end of said body member, a plug member arranged to be seated in said discharge outlet, support means by which said plug member is normally maintained in a position in which said discharge outlet is sealed to prevent passage of liquid through said body member, said means also operating on a rise in ambient temperature to release said plug member to permit the passage of liquid through said body member and an insert member fixedly mounted within said body member to cause the liquid flow, on release of said plug member, to be separated into two streams, said insert member having an axially extending bore providing the first of said streams which has a direct flow path through said body member, and a series of helical passages providing the second of said streams and being so arranged as to impart a swirling motion to said second stream, whereby liquid passing out of said discharge outlet will be broken up into droplets and dispersed over an area proportional to the swirling motion imparted to the liquid.
2. A sprinkler head as claimed in claim 1, in which said body member is provided at said other end with an inturned flange defining said restricted discharge orifice.
3. A sprinkler head as claimed in claim 2, in which said means for releasably holding said plug member on its seating comprise, a

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cover plate on which said plug bears, a pair of lever arms pivotally engaging slots formed in said cover plate one end of each of which has a claw portion adapted normally to engage a shoulder on said body member, and a frangible bulb arranged between the other ends of said lever arms so as normally to hold said lever arms against displacement.

4. A sprinkler head as claimed in claim 3, in which said shoulder on said body member is provided by a retaining ring screwed to said other end of said body member.

5. A sprinkler head as claimed in claim 4, in which said cover plate is of arcuate or dome-shaped form.

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